MONITORING PLAN

PROJECT NO. ME-22 SOUTH WHITE LAKE SHORELINE PROTECTION

DATE: May 16, 2005

Project Description

The South White Lake Shoreline Protection (ME-22) project was proposed on the 12th Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) Priority Project List and is located in the Mermentau basin in Vermilion Parish, Louisiana (figure 1). The project area encompasses the southern shoreline of White Lake from Will's Point to the western shore of Bear Lake. The lake is approximately 54,500 surface acres (~85 square miles). Due to the shallow depth of the lake (~7 ft), wind driven waves easily form. The total area of the South White Lake Shoreline Protection project is approximately 5,473 acres (2,215 ha) and was originally separated into four sub-areas during the project planning and selection process, designated as A through D. However, Sub-Areas B and C have since been deleted from the project area. It was determined that the marsh in these two Sub-Areas was not experiencing high enough rates of erosion to warrant protection. In contrast, Sub-Area A, which encompasses the western end of the project area, and Sub-Area D, which is located along the eastern portion of the project area, are experiencing significant erosion rates (Stead 2004) (figure 1). Sub-area A is composed of inshore emergent marsh (1935 acres [783 ha]) and open water (2782 acres [1126 ha]) habitats (U.S. Army Corps of Engineers [USACE] 2004). Sub-Area D is comprised of approximately 424 acres (172 ha) of emergent marsh as a 300 ft (91 m) wide strip along the entire length of the project area and 332 acres (134 ha) of open water .

Approximately 61,500 ft (18,745 m) of the southern shore of White Lake will be protected through the construction of a foreshore rock dike. The dike will be constructed to an elevation of 3.5 ft (North American Vertical Datum of 1988 [NAVD88]). Gaps for fisheries access will be placed at approximately 1,000-ft intervals. Approximately 157 acres (64 ha) of emergent marsh will be created between the breakwater and existing shoreline through the beneficial use of dredged material. Shoreline loss will be prevented and marsh will be created south of the breakwater. Stabilizing the shoreline will create and/or protect approximately 844 acres (342 ha) of marsh over the 20-year project life.

Erosion rates, calculated by comparing aerial photographs from 1978-1979 to those taken in 1997-1998, revealed an annual shoreline loss rate of 15 ft (USACE 2004). Construction of the foreshore dike will prevent the lake from breaching into adjacent marsh areas and will protect interior marsh, which without the structure, will be subjected to increased wave energy (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority [LCWCRTF & WCRA] 1999).

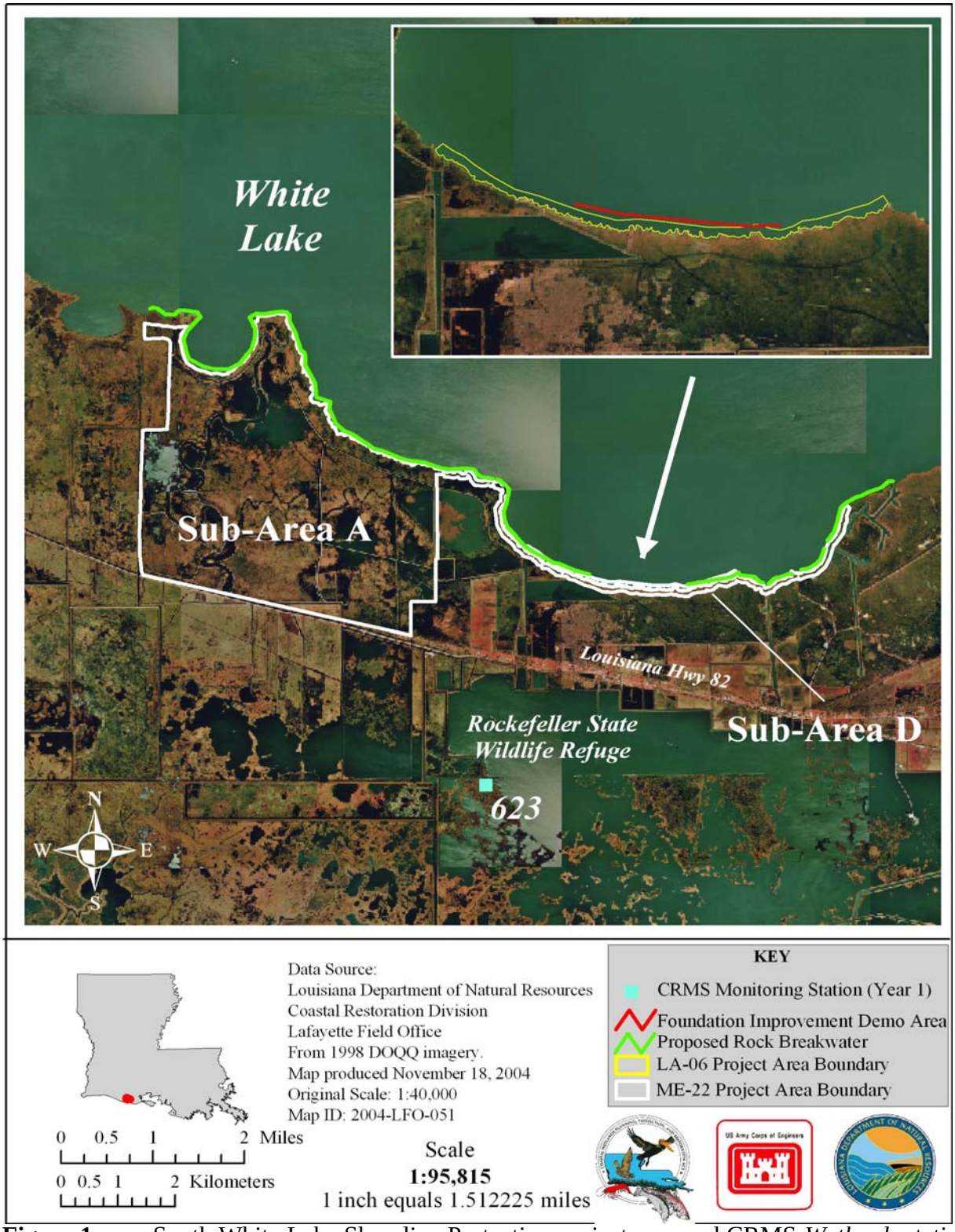

Figure 1. South White Lake Shoreline Protection project area and CRMS-*Wetlands* stations within the general area.

Demonstration Project (LA-06)

The Shoreline Protection Foundation Improvement Demonstration (LA-06) project, authorized through the CWPPRA 13th priority project list, has been incorporated into the design of the ME-22 project. The goal is to improve the cost effectiveness of shoreline protection projects in coastal Louisiana by applying a sand foundation beneath rock dikes. The project objective is to evaluate alternatives to achieving bearing capacity and consolidation settlement design tolerances to reduce 20-year project life cycle costs, as compared to traditional approaches (Stead 2004).

Project Goals and Strategies/Coast 2050 Strategies Addressed

Coast 2050 identified wave erosion, high water levels, and altered hydrology as the major factors contributing to the rapid erosion of the southern shore of White Lake (LCWCRTF & WCRA 1999). The proposed strategy of protecting and stabilizing the southern shoreline of White Lake is supported by the *Coast 2050* Region 4 Ecosystem strategies to promote the stability and protection of bay, lake, and gulf shorelines for the preservation of interior wetlands and the maintenance of favorable hydrologic conditions. Project goals and strategies are provided to LDNR by the sponsoring federal agency through the Environmental Assessment (EA) and/or Wetland Value Assessment (WVA) for the project. The following goals and strategies for the South White Lake Shoreline Protection Project were provided by the USACE (WVA, dated 31 August 2004).

Project Goals:

1) ME-22/LA-06--Stop erosion along the southern shoreline of White Lake from Will's Point to the western shore of Bear Lake and as a result, protect 844 acres (342 ha) of interior emergent marsh over the 20-year project life.
2) ME-22/LA-06--Create 157 acres (64 ha) of emergent marsh between the White Lake shoreline and the foreshore rock dike shoreline through the beneficial use of dredged material.
3) LA-06-- Test two substrate improvement methods designed to increase the feasibility and success of shoreline protection projects where poor substrate conditions exist.

Project Strategies:

The ME-22 and LA-06 project goals will be achieved through the construction of a foreshore rock dike along a 61,500 ft (18,745 m) stretch of White Lake from Will's Point to the western shore of Bear Lake. In addition, the construction of 2 breakwaters with foundation improvements, each 2700 ft (823 m) in length, in an area of poor existing substrate conditions within the ME-22 project area will contribute to the achievement of project goals of LA-06.

Project Features

A 61,500 ft (18,745 m) foreshore rock dike will be constructed along the southern shore of White Lake 200 ft from the existing shoreline at the -1.5 ft (NAVD88) contour from Will's Point to the

western shore of Bear Lake. The crest elevation will be built at an approximate height of +3.5 ft NAVD 88 with a -0.5-ft tolerance. The dike will require 15-24-in stone placed on a geotextile fabric base. Fish dips with a 50 ft top width and 35 ft bottom width, lined with a layer of rock, will be constructed approximately every 1,000 ft to allow some sediment exchange and organism egress and ingress.

The need for a flotation canal to allow access for construction barges and equipment will produce a large amount of dredged spoil. Maximum allowable dredging depth of the flotation channel will be -6.0 ft (NAVD88). The spoil will be placed a minimum of 10 ft landward from the toe of the foreshore rock dike and 50 ft lakeward of the marsh edge. The spoil will be placed at a maximum elevation of 4.0 ft (NAVD88) with a final settled elevation of 1.5 ft (NAVD88) being anticipated during the 20-year project life.

The demonstration project experimental design will include two sub-reaches, each of which will be divided into two 900 ft (274 m) treatment sections and one 900 ft (274 m) control section. Fish dips will be built at approximately 900-foot intervals with a top width of 50 feet. Treatment A will consist of placing sand directly on top of the existing substrate and then placing the rock material on top of the sand foundation. Treatment B will include dredging out the soil foundation, then filling the cavity with sand prior to rock placement on top of the sand foundation. Each treatment was randomly assigned to each of the two sub-reaches (Figure 2).

The two sub-reaches will be placed in reach 5 of the ME-22 project area, one that has a relatively unfavorable soil foundation. All sections will be instrumented with settlement plates, inclinometers, and extensometers to determine the effectiveness of the foundation improvements. The benefits of this project may include a more effective and economical method for the design and construction of rock shoreline protection structures. If the structures experience complete failure, additional rock will be placed to lift the demonstration sections to an effective height.

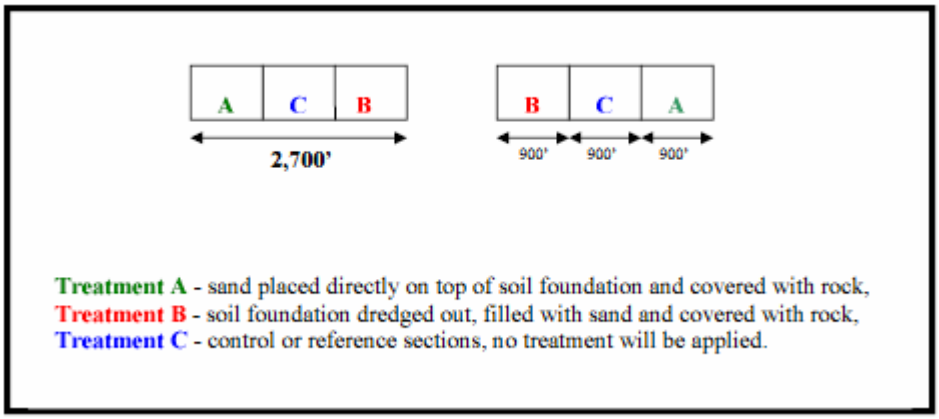

Figure 2. Experimental design layout of the Shoreline Protection Foundation Improvement Demonstration (LA-06) project (Stead 2004).

Monitoring Goals

As authorized by the CWPPRA Task Force, CWPPRA projects authorized for construction after

April 16, 2003 will be monitored only with Coastwide Reference Monitoring System (CRMS)-*Wetlands* stations, other existing data collection, and any additional data-collection specifically added to the project and funded separately from the normal monitoring. As ME-22 is a shoreline protection project, there are no CRMS-*Wetlands* monitoring stations available in the project area, however coastwide aerial photography and satellite imagery collected as part of CRMS-*Wetlands* will be available to assist in evaluating this project.

Priorities:

The South White Lake Shoreline Protection project is predominantly a shoreline protection project, and rock-dike structures have been successful at eliminating shoreline erosion at a number of sites. Consequently, shoreline erosion and integrity of the rock dike will be evaluated only with annual inspections by LDNR's Operations and Maintenance (O&M) Section. The primary importance of the shoreline protection is to preserve 687 acres (278 ha) of existing marsh and 157 acres (64 ha) of created marsh. Sediment is expected to collect behind the rock dike and nourish and sustain marsh created during project construction, over the project life. Aerial photography and/or satellite imagery will be utilized to monitor the effects of the shoreline project on land loss and gain.

Specific Monitoring Goals:

1. To document shoreline change along the south shore of White Lake.

Reference Area:

Collecting monitoring data on both project and reference areas provides a way to achieve statistically valid comparisons and thus a reliable evaluation of project effectiveness. Due to increasing difficulty of finding adequate reference areas for CWPPRA projects, the CRMS-*Wetlands* provides a suite of reference stations to be used for this purpose. CRMS-*Wetlands* will not provide direct information on shoreline erosion; however, observations on this project can be compared with those on similar projects.

Monitoring Strategies

The following monitoring elements will provide the information necessary to evaluate the specific goals listed above:

CRMS-*Wetlands* Strategies

Spatial Data — Aerial photography and satellite imagery will be collected for the entire coast through CRMS-*Wetlands*. The aerial photography will only be analyzed for CRMS-*Wetlands* stations, but the photography collected over this project area will be available to qualitatively access shoreline movement. The satellite imagery will be analyzed to determine land and water areas for the entire coast. This imagery will be subset and used to qualitatively evaluate changes in land and water areas within the ME-22 project area at a coarse (25m) resolution. Photography and satellite imagery for the Mermentau Basin will be collected and analyzed for the year 2005 and every 3 years thereafter.

Project Specific Strategies:

1.	Integrity of rock dike (ME-22)	Annual inspections by the LDNR O&M Section will be used to evaluate the structural integrity of the rock dike along the south shore of White Lake.
2.	Engineering Surveys	USACE will monitor instrument readings and survey the centerlines and cross sections over a five-year period to evaluate the effects of sand placement below the rock dike. A total of 21 readings will be collected after rock placement over 5 years. Vertical and horizontal behaviors of the substrate and overall dike settlement will be monitored, and possible modes of failure will be identified.

Anticipated Statistical Analyses and Hypotheses

The following hypotheses correspond with the monitoring elements and will be used to evaluate the accomplishment of the project goals.

1. Descriptive and summary statistics will be used to compare estimated rates of shoreline movement from aerial photography with historical values for the area. This will allow for the analysis and long-term evaluation of shoreline movement along the South White Lake project area (goal 1). Data will be obtained from aerial photography and satellite imagery.

Goal: Decrease the rate of shoreline erosion along the south shore of White Lake from Will's Point to the western shore of Bear Lake

NOTE: Available ecological data, including both descriptive and quantitative data, will be evaluated in concert with the statistical analyses of all of the above data to aid in the determination of overall project effectiveness. This includes ancillary data collected in the monitoring project but not used directly in statistical analysis, as well as data available from other sources (USACE, USFWS, USGS, LSU, DNR, etc.)

Notes

1. Proposed Implementation:	Start Construction:	December 2005
	End Construction:	August 2006
2. USACE Point of Contact:	Melanie Goodman	(504) 862-1940

3. DNR Project Manager: Andrew Beall (225) 342-6690
   DNR Monitoring Manager: Troy Barrilleaux (337) 482-0657
   DNR RTS Manager: Susan Hill (225) 342-1359

4. Monitoring reports produced every three years will describe the status and effectiveness of the project.

5. Maintenance surveys of the ME-22 rock breakwater will be conducted at years 7 and 15 following project construction to observe settlement and slumping in order to determine maintenance requirements. A 1.5 ft elevation (NAVD88) lift over 50% of the overall constructed rock breakwater length is currently budgeted if maintenance is necessary. When possible, these surveys will coincide with flights scheduled for aerial photography.

6. References:

Stead, M. A. 2004. Ecological Review (ME-22). Baton Rouge: Louisiana Department of Natural Resources, Coastal Restoration Division. 12 pp.

Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority. 1999. Coast 2050: Toward a sustainable coastal Louisiana, the appendices. Appendix E–Region 3 supplemental information. Louisiana Department of Natural Resources. Baton Rouge, Louisiana. 173 pp.

Raynie, R. C., J. M. Visser. 2002. CWPPRA Adaptive Management Review Final Report. Prepared for CWPPRA Planning and Evaluation Subcommittee, Technical Committee, and Task Force. Baton Rouge, Louisiana. 47 pp. Plus appendices.

Thibodeaux, C. 1998. Boston Canal Vermilion Bay Shoreline Protection (TV-09) three-year comprehensive monitoring report. Louisiana Department of Natural Resources. Baton Rouge, Louisiana. 21 pp.

U.S. Army Corps of Engineers. 2002. Candidate Project Information Sheet for Wetland Value Assessment: South White Lake Shoreline Protection (unpublished). 9 pp.

U.S. Army Corps of Engineers. 2004. Environmental Assessment: South White Lake Shoreline Protection. New Orleans: U.S. Army Corps of Engineers. 25 pp.